

REMARKS

Claims 1-7 and 9-14 are pending in the present application. Claim 1 has been amended. No new matter has been added. Entry of the present Amendment is requested.

Claims 1-14 have been rejected under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,380,288 to Hojo *et al.* Additionally, Claims 1-14 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over JP No. 09-111839 to Suzuki in view of European Patent No. 0 478 274 A1 to Etoh.

Applicants respectfully traverse these rejections for the following reasons.

Hojo discloses a rubber composition containing, as the reinforcing filler, carbon black characterized by a specific range of N_2SA and a specific range of DBP. However, Hojo is completely silent about the parameters of D_w/D_n , the equation relating to T_{int} , and $\Delta D_{50}/D_{st}$. Thus, Applicants submit that the presently claimed rubber composition of the present invention, as defined by amended Claim 1, is not anticipated by Hojo

Further, an essential difference between the present invention and Suzuki lies in that the carbon black of the present invention has a broad distribution of aggregates, whereas the carbon black of Suzuki has a narrow distribution of aggregates. Because of this difference, the rubber composition of the present invention comprising the carbon black having a broad aggregate distribution can exhibit excellent properties.

In the present invention, the distribution of the carbon black aggregates is rated by two parameters: one is a $\Delta D_{50}/D_{st}$ ratio, which is newly recited in the amended Claim 1, and the other is a D_w/D_n ratio. Since the D_w/D_n ratio is proportional to the value of D_w (weight-average

molecular weight), it rates aggregates with large diameters highly $\Delta D_{50}/D_{st}$, which denotes a half-value breadth, and is a conventionally known parameter for analyzing aggregate distribution.

In contrast, the carbon black of Suzuki is rated only by the conventional parameter of $\Delta D_{50}/D_{st}$. Thus, Suzuki possesses neither the motivation nor the conception of highly rating carbon black aggregates having large diameters.

If both ratios of $\Delta D_{50}/D_{st}$ and D_w/D_n are large, then the carbon black is regarded as having broad distribution. Conventionally, when the aggregates have a narrow distribution, the carbon black is rated as excellent. Accordingly, Suzuki seeks to achieve a carbon black with a small $\Delta D_{50}/D_{st}$ value.

In contrast, the carbon black of the present invention is devised to display a broad distribution of aggregates. Due to this broad distribution, the carbon black of the present invention can exhibit excellent properties, as explained below.

Referring to Table 1 on page 26 of the present specification, Examples 1 and 6 show that the rubber compositions comprising carbon black with aggregates having a broad distribution (D_w/D_n ratios were 1.85 and 1.96, respectively) exhibited excellent results in both wear resistance and heat-buildup property, as compared to Comparative Examples 2 and 3 (D_w/D_n ratios were 1.66 and 1.60, respectively).

The effect on additional properties can be demonstrated by another parameter expressed by the equation relating to Tint. As seen from the results summarized in Table 2 on page 27 of the present specification, Comparative Example 4 shows that carbon black with a low (95) Tint value produced poor results of wear resistance (96) as shown in Table 1, making is unusable for

tire treads. Again, the parameter of Tint is indicative of the reinforcement of the rubber composition by carbon black. Thus, the rubber composition comprising carbon black with a broad aggregate distribution (Dw/Dn ratio: 1.80-2.40) and large Tint value (high reinforcement) can achieve excellent effects in wear resistance and heat-buildup property, making the composition suitable for tire tread use.

As mentioned above, the carbon black disclosed in Suzuki has a narrow distribution of aggregates, accordingly, it cannot exhibit the excellent characteristics achieved by the present invention. In Suzuki, the results of Example 5 show that the carbon black with the broadest distribution may be relevant to the present invention (1.05-2.50), nonetheless, the fundamental DBP value is outside the specific range of the present invention (140 - 200 ml/100g).

According to the present invention, it is essential that the carbon black in a rubber composition concurrently satisfies the requirements of (i) DBP: 140 - 200 ml/100g; (ii) Dw/Dn: 1.80 - 2.40; (iii) $Tint \geq 0.100 \times N_2Sa + 93$; and (iv) $\Delta D_{50}/D_{st}$: 1.05 - 2.50. As set forth on page 6 of the present specification, if the ratio of Dw/Dn is within the specific range, then the heat-buildup property can be maintained at a low level and the wear resistance is good. Further, if the conditions of the equation of $Tint \geq 0.100 \times N_2SA = 93$ are met, the composition exhibits excellent reinforcing property and wear resistance.

Neither Suzuki nor Etoh teach or suggest the ratio of Dw/DN and/or the specific equation relating to Tint. Thus, Applicants submit that the present claimed invention cannot be conceived or reached, even if it is not rendered *prima facie* obvious by Suzuki and/or Etoh.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No. 09/695,317

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE



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PATENT TRADEMARK OFFICE


John T. Callahan
Registration No. 32,607

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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 8 is canceled.

The claims are amended as follows:

1. (Amended) A rubber composition comprising:

a rubber component selected from the group consisting of at least one of natural rubber
and a diene-based synthetic rubber; and

a carbon black,

wherein said carbon black has a dibutyl phthalate adsorption amount (DBP) of 140 to 200
ml/100 g, an aggregate of said carbon black has a ratio (D_w/D_n) of a weight average diameter
(D_w) to a number average diameter (D_n) of 1.80 to 2.40, and said carbon black has a specific
tinting strength (T_{int}) and a nitrogen adsorption specific surface area (N_2SA) satisfying an
inequality: $T_{int} \geq 0.100 \times \text{nitrogen adsorption specific surface area } (N_2SA) + 93$, and

wherein a ratio ($\Delta D_{50}/D_{st}$) of a half-width (ΔD_{50}) to a mode (D_{st}) of the aggregate of said
carbon black is in a range of 1.05 to 2.50.